

SUPPORT FOR THE AMENDMENTS

Support for the amendment of Claims 15 and 25 is found on page 3, lines 1-6, in the specification.

Claim 16 is amended to be consistent in description with Claim 15.

No new matter is believed added to this application by entry of this amendment.

Claims 15 – 25 are active.

REQUEST FOR RECONSIDERATION

The claimed invention provides a process for preparing an aqueous polyurethane dispersion, comprising:

preparing a polyurethane by reacting at least one polyfunctional isocyanate having 4 to 30 carbon atoms with at least one diol in the presence of N-ethylpyrrolidone or N-cyclohexylpyrrolidone; and

dispersing the prepared polyurethane in an aqueous medium,

wherein

the polyurethane comprises at least one component having at least one hydrophilic group or a group which can be converted to a hydrophilic group, and is dispersible in water.

Applicants have described the advantages of the claimed invention as follows:

The inventive preparation of the polyurethanes in the presence of N-(cyclo)alkylpyrrolidones leads to at least one of the following advantages:

- Reduced solvent requirement.
- The dispersions are easier to apply by spraying or through nozzles, since encrustation or contamination on spraying tools is reduced.
- Lower toxicity than, for example, N-methylpyrrolidone.
- The prepolymer solutions have a lower viscosity.
- The rheology of the polyurethane dispersions is improved.
- The wetting behavior of substrates or additives is improved.
- Lower yellowing under light and/or heat exposure.

- Greater frost resistance of the dispersions.
- Improved flexibility, particularly lower-temperature flexibility, of the resultant films.
- Higher gloss of the resultant films.

Whereas the subsequent addition of N-alkylpyrrolidones, as known from the prior art, serves merely to adjust physical parameters of the finished dispersion, the inventive preparation of polyurethanes in the presence of N-(cyclo)alkylpyrrolidones leads to advantages associated with the preparation of the polyurethanes, which would not be possible to achieve by subsequent addition. One possible reason for this might be that the polyurethanes prepared inventively absorb the N-(cyclo)alkylpyrrolidone by swelling, for example, over the whole of the cross section, whereas in the case of subsequent addition only superficial absorption, at best, can take place.

Applicants particularly note that according to the invention the polyurethane is prepared by reaction of isocyanate and diol components in the presence of N-ethylpyrrolidone and/or N-cyclohexylpyrrolidone. Preparation in the presence of the cited solvents is understood to provide differing results in comparison to addition of the solvent to the polyurethane after it is prepared.

Applicants wish to thank Examiner Greso and SPE Cano for the useful and courteous discussion of the above-identified application with Applicants' U.S. representative on March 22, 2011. At that time, Applicants' U.S. representative reviewed the description of WO 99/50362 and described that the cited reference provided two different lists of solvents for two different purposes. The first list, on page 4, lines 29-32, indicates organic solvents which are water-miscible and are suitable for step i) preparation of the polyurethane. Once prepared, the polyurethane is dissipated in an organic solvent system as described on page 7, lines 16-34. Applicants' U.S. representative argued that one of ordinary skill would not be motivated to look to the solvents of the second list to identify solvents in which the polyurethane would be prepared. Applicants wish to further thank the Examiners for the suggestion to amend Claim 15 to specifically describe that preparation is via reaction of a polyisocyanate and a diol. The following reiterates and expands upon that discussion.

Applicants respectfully note that Claim 15 is herein amended to recite that preparation of the polyurethane is via reaction of a polyisocyanate and a diol.

The rejection of Claims 15-22 and 24-25 under 35 U.S.C. 102(b) over Pears et al. (WO 99/50362) as evidenced by Argabright (U.S. 3,526,655) is respectfully traversed.

Pears describes a method to prepare colored polyurethanes and inkjet inks containing the colored polyurethanes. The polyurethanes are prepared by i) reaction of an organic polyisocyanate and at least one isocyanate reactive compound having water-dispersing groups. In a second step, a chromophoric molecule having a group reactive to a chain terminal functionality is reacted with the polyurethane chain and terminates the chain (page 1, lines 23-30). Pears describes water-miscible solvents suitable for lowering the viscosity of the polymerization step i) on page 4, lines 29-32. The list includes N-methylpyrrolidone, dimethyl sulphoxide, a dialkyl ether of a glycol acetate and methyl ethyl ketone.

Pears further describes that once the water dissipatable polyurethane is prepared, it is isolated and placed in a liquid medium suitable for preparation of an ink-jet ink. The ink solvent medium may be aqueous or non-aqueous and a list of suitable solvents presented on page 7, lines 16-34, includes N-methyl-pyrrolidone and N-ethyl-pyrrolidone. The Office appears to interchange the two lists as equivalent in support of the anticipation rejection. However, Applicants submit that one of ordinary skill recognizes that the two lists are not interchangeable. The list on page 7 includes alcohols which would compete for reaction with the polyisocyanate group during the polymerization stage i).

Applicants note the Office's reference to Argabright which describes a reaction of a metal cyanate and an alkyl halide to form an isocyanate. Applicants respectfully submit this technology is not related to the synthesis of polyurethane polymers and has no relationship to solvent utility in preparation of a polyurethane polymer or the preparation of an ink-jet ink.

In view of all the above, Applicants submit that Pears does not recite all the elements of the claimed invention as described according to the claimed invention and cannot anticipate the invention.

Moreover, Applicants submit that Pears does not suggest or make all the elements of the claimed invention known and, accordingly, a conclusion of obviousness cannot be supported by the description of the cited reference.

In view of all the above, Applicants respectfully request that the rejection of Claims 15-22 and 24-25 under 35 U.S.C. 102(b) over Pears as evidenced by Argabright be withdrawn.

The rejection of Claim 23 under 35 U.S.C. 103(a) over Pears as evidenced by Argabright in view of Bruchmann et al. (DE 10161156: US 2005/0043467 as English equivalent) is respectfully traversed.

Applicants note that Claim 23 depends from Claim 15 and includes all the description of the independent claim. The failure of the primary reference combination to anticipate or render the invention obvious is described above. Bruchmann describes an aqueous dispersion of a water dispersible polyurethane and a process for preparing the aqueous dispersion involving reacting the monomers in the presence of a cesium salt. However, Bruchmann does not disclose or suggest the addition of N-ethyl- or N-cyclohexylpyrrolidone to the preparation of a polymer mixture as according to the present invention.

In view of all the above, Applicants respectfully submit that the cited combination of references does not describe the elements of the present invention and therefore a conclusion of obviousness cannot be supported. Accordingly, withdrawal of the rejection of Claim 23 under 35 U.S.C. 103(a) over Pears as evidenced by Argabright in view of Bruchmann is respectfully requested.

Application No. 10/591,662
Reply to Office Action of February 2, 2011

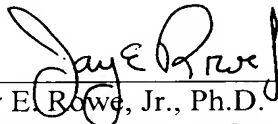
Applicants respectfully submit that the above-identified application is now in
condition for allowance and early notice of such action is earnestly solicited.

Respectfully submitted,

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